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THE NEW YORK CANALS.

THE railroad traveller speeding across the State of New York gets occasional glimpses from the car window of a narrow channel of water; while here and there he may pass a bluff-bowed, weather-beaten boat, preceded by a team of straining horses, which drag the lumbering craft by painful inches along the route. The battered boats, the toiling horses, and the general air of neglect and dilapidation contrast strongly with the solid four-tracked road-bed on the neighboring railway, busy with long trains of freight cars drawn by powerful locomotives; and it is easy for the stranger to believe that he has found one relic of by-gone days in this new and modern continent. In truth, however, the situation is more significant of the rapidity of American development. For it is hardly three-quarters of a century since DeWitt Clinton's great undertaking was accomplished. Within less than half of that time the now decadent ditch was still the all-important transportation route between the lakes and the Atlantic. Even a decade ago it was a factor of no mean degree in the east and west movement of commodities. The rapid transition to the present situation is worthy of attention as a striking feature in the economic history of the United States; and an examination into the causes and consequences of the change may indicate whether the present situation is to be the final outcome or has been due to factors which may be altered so as to bring about a revival of canal transportation.

I.

The early history of the canals of New York State does not require extended notice here, and a brief account

will serve to introduce the discussion on the events of the last three decades.

The main object in the construction of the original Erie Canal was to reach the grain fields of Western New York. During the first decades of this century the fertile lands of the Genesee country (peculiarly adapted to the raising of cereals) were being rapidly settled by emigrants from New England; but the region was almost completely isolated from a market, so that both the eastward movement of agricultural and forest products and the return movement of imports were closely limited by the difficulties and high cost of transportation. Goods and passengers were moved only by wagons and stages over roads of the most primitive kind. Freight charges from Buffalo to Albany were \$100 a ton; and even by the water route as far as Cayuga Lake,—navigable for boats of not over sixteen tons,—the price of transportation from Schenectady to Seneca Falls was \$32 per ton.

The Erie Canal from Buffalo to Albany, opened in 1825, provided the much-needed outlet for this region. It had four feet depth of water, and was navigated at first by boats of thirty tons. Freight rates from Buffalo to Albany were reduced at once to \$10 a ton; and from this figure rates became steadily lower, as the system of canal transportation developed. DeWitt Clinton's estimate of 400,000 tons to be accommodated by the canals was realized in the first year. As early as 1837 the Erie and Oswego Canals carried more than double that amount; and the 250,000 tons on the Champlain Canal (opened in 1822, from the Hudson to Lake Champlain), and smaller amounts on the branch canals then completed, swelled the total traffic to 1,171,296 tons. From this figure the traffic steadily increased. It doubled itself within ten years, and by 1854 was over 4,000,000 tons a year,—ten times the estimated traffic at the commencement of the undertaking.

Although constructed primarily to supply a State need,

it soon became evident that the benefits of the Erie Canal were to extend far beyond the State boundaries. The settlement of the regions bordering on the great lakes was much facilitated by the new transportation route; and the products of this section, as well as of western New York, reached a market through the Erie Canal. Already in 1837, 30 per cent. of the cereals transported on the canals came from beyond New York; and the proportion of such traffic rapidly increased, adding alike to the canal traffic and to the commercial importance of New York city and state.

This influence of the canal on the commercial development of New York was one of the most important results of the opening of the water route to the lakes. Before 1820 the county of Philadelphia had a larger population than New York county; but by 1830 New York had gained first place in population and commercial importance in the United States,—a position steadily maintained and made more secure in the decades following. Along the canal and at its termini, Albany, Troy, Utica, Rome, Syracuse, Rochester, and Buffalo at once developed from villages to considerable cities. It has been through the growth of these commercial centres that New York, without large mineral resources or special industrial advantages, has secured and maintained its place as the most populous and most wealthy State in the Union.

The astonishing success of the original canals led to the construction of the numerous branch canals,* and also to the early adoption of a scheme of enlargement which should adapt the Erie Canal to the constantly increasing traffic. In 1835 work was begun on this project, to provide a route navigable for boats drawing six feet of water and of two hundred and forty tons' capacity,—three times the capacity of the largest boats which could be used

* The most important was the Oswego Canal, from Syracuse to Lake Ontario, opened in 1828.

on the original canal. The actual construction, however, proceeded but slowly. In the early forties there was a complete suspension of all new work ; and, when in 1854 work was resumed, it was again without energetic efforts, and not until 1862 was the enlargement of 1835 nominally completed.

Despite this delay in executing the needed enlargement of the main trunk route, the canals of New York, from the time of their construction until after the last third of the century had begun, held undisputed their position as the main transportation route from the lakes to the seaboard. The first railroads were built, not as rivals, but as adjuncts to the canals, collecting and distributing the waterway freights in isolated districts more economically than stage and wagon routes, but in no way interfering with the main lines of traffic. Even after railroads had been constructed across the State from Buffalo to Albany and New York, and the tolls which the State at first collected on railroad freight were abolished (in 1851), the canals continued to carry the bulk of the traffic. As late as 1862 the ton-mileage of canal traffic was more than double the combined ton-mileage of the New York Central and the Erie Railroads. That was a maximum year ; and in the years immediately following both canal and railroad traffic declined, but without materially changing their relative positions. In 1866 the canal traffic comprised 60 per cent. of the freight movement across New York State. During the decade then ended, railroad traffic had doubled and canal traffic had increased nearly 80 per cent.

It is in the development of internal commerce since the Civil War that the decline of the canals is to be traced. Up to that time the railroad freight traffic had been confined to the more finished and costly merchandise, which could afford to pay much higher rates of freight in order to secure quicker delivery. But the grain, flour, and lumber to the east, and coal to the west, which comprised

the great bulk of freight moved, continued to go by canal. As early as 1863 we may notice a decline in the flour traffic on the canals; and within a few years this had been reduced to one-fourth of the former traffic, and before long had almost disappeared. The other important items, however, showed no falling off at this time, and indeed showed an upward movement in the years of expanding business from 1866 to 1873. But it was also true that the railroads were now securing a share of the bulk commodities, and that their freight traffic as a whole was growing at a much more rapid rate than that of the canals.

Before 1868, practically the whole of the grain arriving at New York came by way of the canals; but by 1872 30 per cent. came by railroad. In the latter year the total tonnage on the New York railroads was 8,025,923, on the canals 6,673,370 tons. The total movement was on the railroads 2,260 million of ton-miles, and on the canals 1,594 millions. The canal tonnage for this year was the largest ever carried on the canals, but the ton-mileage was barely equal to that for 1862.

In the years of depression following 1873, canal traffic began to show a positive reduction in volume, the Champlain Canal, however, carrying about the same tonnage as in the years before 1872. In 1876 but 4,172,129 tons were moved on all the canals, less than two-thirds of the traffic for 1872. The railroads meanwhile were showing a steadily increasing traffic, though with smaller increments than in the years before 1873, and were thus gaining an increasing share of the total traffic. In 1876 the New York railroads carried 14,983,600 tons of freight, more than three times the aggregate canal tonnage; and the receipts of grain by rail at New York were 57 per cent. of the total receipts.

The events of these few years indicated to some the early abandonment of the canals; and a writer in *Scribner's Magazine* at the time said of the Erie Canal: "In five

years from this time [1877] it is probable that only 25 per cent. of the tonnage of 1862 will continue to exist. The rate of tolls that can be exacted from the small tonnage then transported will not suffice to maintain the canal in proper order, and it will then be possible for the New Zealander of Macaulay to sketch the ruins of aqueducts from the summits of disused locks. In the face of fruitless efforts to avert the result, and after long discussion of its future management, the canal will be forever abandoned.” *

Events did not justify this prediction. The years from 1876 to 1880 proved an upward period in the figures of canal traffic, which reached 6,457,656 tons in the latter years. Three of the branch canals had been discontinued in 1877, and the traffic for 1880 was in fact larger than the aggregate for the same canals in any former year. The Erie Canal in 1880 carried 4,608,651 tons,—over 20 per cent. more than in any previous year, the increase being for the most part in the grain traffic. This year, however, proved exceptional; and in the following year the Erie Canal traffic was about a million tons less than in 1880. In 1882 the total canal traffic, while well above that for the minimum year 1876, was about 16 per cent. below the maximum figure for 1872. This decrease was, however, altogether in the smaller canals, the Erie and Champlain showing practically the same figures as ten years before. But during the same decade railroad traffic had doubled, and the railroad proportion of grain receipts at New York had risen to 63 per cent.

In 1882 the canal tolls were abolished; and the canals became free waterways, maintained by the State from general taxation. This change did not produce any marked effects on the traffic, which, with slight variations, remained at about the figures of 1882 until the end of the decade. Railroad traffic, meanwhile, continued to increase,

*John G. Stevens, in *Scribner's Magazine*, xv. p. 124.

though at a smaller rate than theretofore. By 1890 the canal traffic was but 12 per cent. of the entire freight movement across New York State; and the proportion of grain arriving at New York City by canal was but 32 per cent. of the total receipts, and in that year for the first time was less than half of the total receipts during the season of navigation.

Since 1890 the canal traffic has again declined positively as well as relatively, the minimum years of 1895 and 1898 being followed by small gains in 1896 and 1899. The tonnage for 1898 was 3,360,000 tons, and for 1899 3,689,000 tons; while the aggregate freight tonnage on the principal New York railroads has increased to 67,000,000 tons. This recent decline has affected all of the canals now in use, though the Champlain Canal had shown a much smaller decrease than the others. The west-bound traffic, too, has almost held its own; and the largest falling off has been in the through grain traffic, which in 1899 was only about half of that in 1890. The canal proportion of New York grain receipts has fallen to 12 per cent., and of the receipts during the season of navigation to 16 per cent.

Viewing the whole period from 1868 to 1899, the total canal traffic has declined from 6,442,000 tons to 3,689,000 tons, the decline being mainly in forest and agricultural products, coal and ores, which show less than half the volume moved thirty years ago. Of the particular canals the decrease in traffic has been most marked on the branch canals discontinued in 1877, and on the Oswego Canal, where the traffic has fallen from 940,000 tons in 1868 to 50,000 tons. The Champlain Canal has maintained its traffic to a larger degree than the others, having a tonnage of 800,000 at present as compared with 1,120,000 tons in 1868. The Erie Canal now carries about 2,500,000 tons as against 3,346,000 tons in 1868.

While the actual decrease in tonnage on the Erie and

Champlain Canals is well marked and deserving of notice, the existing traffic is still of considerable volume, and these canals are yet far from having reached a condition of disuse. But when the canal traffic is compared with the railroad traffic, the decline of the latter in comparative importance is unmistakable. While as late as 1869 the canal traffic, measured in ton-miles, was equal to the aggregate railroad traffic across New York State, at present the canal traffic is but 5 per cent. of the railroad traffic, and is less than one-sixth of the traffic on either the New York Central or the Erie Railroads.

Of the through traffic the canals have continued to secure a larger share of the business. From 1880 to 1890, while the total tonnage of the New York Central Railroad was from two to three times the canal tonnage, the through tonnage on the canals was from 50 to 80 per cent. larger than on the railroad. But even here the railroads have now become the most important means of transportation. In 1892 the through freight tonnage on the New York Central was for the first time larger than the canal through tonnage; and since 1895 the railroad had steadily increased both its volume and proportion of through traffic, carrying during the last two years more than twice as many tons of through freight as the canals.

II.

The forces which have produced the decline in canal transportation which has been noted are, as usual in economic history, many and complex; and the different factors have been of widely varying importance.

In respect to lumber and other products of the forest the decreased canal tonnage is due, in a measure, to the smaller amount of traffic across New York State. The New York forests have long since been denuded; and in recent years the Michigan supply has fallen off, and with

it the lake lumber business. The lumber receipts by lake at Tonawanda — which represent the bulk of the lumber traffic to be moved across New York — were in 1898 but two-thirds of the receipts in 1890. With a smaller traffic to be moved, a decline in canal movement was inevitable.

So, too, in regard to iron ore, the decline in canal traffic has been caused by the smaller output of the Lake Champlain mines since the development of the vast deposits along Lake Superior. The output from these latter fields has been smelted near the bituminous coal fields, and the increasing traffic in both ores and iron products has been thus far beyond the field of direct canal competition.

The decline in coal traffic is due in part to two other causes: (1) the construction of railroads from the mines in eastern Pennsylvania to Lake Erie, which provided a shorter and more direct route than that *via* the Hudson River and the canals, and without transfer *en route*; and (2) the extensive use of bituminous coal, which is mined in regions not directly accessible for canal movement either east or west. The development of coal traffic has been one of the most important items in the expansion of railroad traffic; and the geographical situation of the mines and markets explains why the canals, in their present condition, have not shared in this development.

Another considerable part of the railroad freight traffic to-day is the movement of live stock and fresh meats; and for this business the canals have never been a competitor, on account of the necessity for rapid movement, by furnishing which the railroad has made the traffic possible. For highly manufactured goods and expensive merchandise, freight rates are so small a proportion of their value that terminal accommodations and speed in delivery are often considered of more importance than cheaper rates; and the railroads have hitherto provided better facilities in these directions than the canal lines.

So far as the causes thus far indicated account for the

development of railroad traffic and the decline of canal traffic, the outcome would seem to be the result of natural forces. And it must be admitted, too, that these explanations account in some measure for the predominance of the railroad over the canal as a means of transportation for freight. They do not, however, give a complete explanation of the existing situation, either in respect to the expansion of railroad traffic or the decline in canal traffic.

The additional factors, although they have affected in no little degree the movement of commodities already mentioned, can best be noted in connection with the grain traffic. We have already seen, in following the traffic history of the past three decades, the decline in the canal tonnage of grain, both in actual amount and, more especially, in the percentage of the total receipts at New York. The increase in the total receipts at New York is sufficient to show that in this case the explanations of a decline in traffic or of geographical changes in sources of production are not adequate. The same point is emphasized by noting the rapid increase in the grain receipts by lake at Buffalo. In 1869 these receipts were 37,000,000 bushels, of which 28,600,000 bushels, or 77 per cent., were forwarded by canal. In 1898 the lake receipts of grain at Buffalo had risen to 215,000,000 bushels, of which less than 11 per cent. went forward by canals. The canal shipments were, in fact, less by 5,000,000 bushels than in 1869, and less than a third of the canal shipments in 1880, the decline in canal shipments being most marked after 1890. As practically all of the lake receipts of grain at Buffalo are forwarded to the Atlantic coast, and as all must be transferred at Buffalo, whether forwarded by rail or canal, it is evident that the declining canal tonnage of grain—in the face of a steadily increasing traffic between its terminal points—is due directly to the competition of the railroads, which in this case have no geographical advantages.

The immediate explanation of this diversion of traffic from the canal to the railroads is the reduction in rail rates and the better facilities by which the railroads offset the difference in rates remaining in favor of the canals. It has therefore been argued that this situation proves the essential and permanent superiority of railroads over canals for any and all classes of traffic, and that the day of usefulness of even the Erie Canal has passed. The question, however, requires further study as to the causes of the reduced rates and the better transportation facilities by railroad, to learn whether these are due entirely to causes peculiar to railroads or to methods which may be applied also to canal transportation.

Such an investigation shows that, while the railroads during the past thirty years have made constant and large improvements both in their physical condition and in their methods of administration, the canals have in both respects remained practically at a standstill. In this period the road-beds of the railroads have been entirely rebuilt with heavy steel rails, stone ballast, and steel bridges, in place of the strap rails, sand ballast, and wooden bridges first used; and, with the more solid and durable road-bed, it has been possible to use larger and heavier cars and more powerful locomotives. Thirty years ago freight cars of ten tons were the largest made, and a train-load of two hundred tons was rare. To-day the freight cars used on the trunk roads carry at least thirty tons, and fifty-ton steel cars have been constructed. Train-loads of one thousand tons are common; and, with locomotives and road-bed improvements now under way, it is expected on some roads to move trains of two thousand tons of paying freight. The extent of such improvements is indicated by the expenditure for these purposes. On the New York Central and Hudson River Railroad alone the cost of road and equipment has been increased since 1870 from \$60,000,000 to \$165,000,000, an increase of over \$100,000,000,

or nearly twice the total expenditure for such purposes before 1870. The other roads across New York State have expended correspondingly large sums for new construction and for reconstruction of road-bed and rolling stock.

On the other hand, no permanent enlargements and new improvements have been carried through on the canals for nearly forty years; while in many respects the canals are practically the same to-day as when De-Witt Clinton last beheld them. The same style of lock gates are employed, but they are more unwieldy because more ponderous. The same system of animal towage still prevails, but the boats move more slowly because they are larger and more deeply submerged. The dimensions of the prism and locks, which limit the largest boats possible on the canals, remain as they were in 1862. The only changes in the physical condition of the canals since that time have been the completion of some parts of the former enlargement not finished in 1862, and the lengthening of one chamber of about two-thirds of the locks so as to admit two boats at one time. This last change has encouraged the system of moving boats in trains of two in place of singly,—practically the sole change in transportation methods on the canals as compared with the increase in railroad train-loads from two hundred to two thousand tons.

Of equal importance has been the great improvement in the business management of the railroads, while on the canals the business management has remained as stationary as the physical condition of the prism and structures. The consolidation of small railroad companies into through trunk lines has reduced general expenses, and the large corporations have many advantages in securing capital and in studying the problems of operation so as to make use of the most economical methods both in transportation and terminal facilities.

These factors have aided directly in the reduction of rail rates. In addition, the large railroad companies offer other advantages which often offset a considerable difference in rates. Their through bills of lading relieve the shipper of all responsibility and guarantee the safe delivery of goods at final destination; while their well-organized system of soliciting freight and their ability to make long-time contracts make it possible to secure business in the face of lower but less certain rates.

In marked contrast with the railroad organizations the traffic on the canals continues to be handled by single boatmen or small companies owning each a few boats, with too little capital to make use of labor-saving devices or to control their own terminal facilities, with no organized system for soliciting traffic, unable to make long-time contracts, and without such responsible standing in the community as to encourage large shippers to patronize their lines. The absence of large transportation lines on the canals has been due in part to the lack of physical improvement, which inevitably has discouraged active business managers from exploiting a field where the possibilities of business were so narrowly limited by the neglect of the State. In 1896 there was added to this a statutory provision restricting canal transportation to corporations with not over \$50,000 capital; and, so long as this limitation remains in force, the development of transportation business on the canals must be seriously hampered.

From these considerations it is evident that the existing situation of canal and railroad traffic in New York State demonstrates merely that the canals and business methods of 1860 cannot actively compete with the railroads and business methods of 1900. And it is at least worth while to investigate further the possibilities of applying to the canals the same process of improvement in physical condition and business management which has been so successful in the case of the railroads.

III.

The influence of the canals, even in their present condition, on railroad freight rates is deserving of consideration. The average rates of freight per ton-mile on the trunk railroads of the United States have declined during the last thirty years from about 2 cents (specie value) to about 6 mills on most of the standard routes, but on the Lake Shore & Michigan Southern Railroad to 5 mills, and on the Chesapeake & Ohio Railroad to 3.6 mills. The low average on the last-named road is due to the fact that most of its freight traffic is in long hauls of coal; and there is very little local or high-grade traffic, as on other roads. The average rates on the New York canals have declined in the same period from 6.5 mills to 2 mills, the present average being about one-half the average rate by the lowest railroad, and about one-third of the average rate on most trunk roads.

On certain classes of commodities, however, the railroad rates are much closer to the canal rates. These are low-grade articles, which on the one hand are either unable to pay high rates of freight or are subject to special competition, and on the other hand are shipped in large quantities, and so capable of being moved in heavy train-loads and transferred at terminals by mechanical appliances which reduce the cost of handling.* Thus the coal traffic on the Chesapeake & Ohio Railroad is moved at an average rate of 3.3 mills per ton-mile, and the coal shipments to the seaboard at an average of 2.21

* The writer would take exception to the statement sometimes made that railroads can afford to carry low-grade freights at a rate that will pay anything over "operating" expenses. Even value of service rates must, in the long run, pay *all* the special expenses incurred for the special traffic; and these include, in addition to the operating expenses, the expenditures for special terminals and rolling stock (cars and locomotives) used for this traffic, and some proportion of the expenditure for construction and maintenance of way, due to the more substantial road-bed necessitated by the larger traffic and heavier train-loads.

mills, which closely approaches canal rates. This last is an exceptional rate, however, even for coal. The lowest average rate for coal on the Lehigh Valley Railroad has been 6.5 mills, and on the Erie Railroad 5.37 mills per ton-mile. Iron ore on the new railroad from Conneaut to Pittsburg is moved in 1,500 ton train-loads at an average rate (during 1899) of 3.65 mills per ton-mile.

On grain, the commodity for which the railroads come in most direct competition with the canal, the railroad rates have been reduced almost to the rates on the present canal. The rail rate on wheat from Buffalo to New York in 1898 and the summer of 1899 was 3.5 cents per bushel, and the canal rate 2.8 cents,—equal to 2.5 mills per ton-mile on the railroad and 1.9 mills per ton-mile on the canal. It is significant that these low railroad rates on grain—so much less even than rates on other bulk commodities of less value—are given only on the trunk lines to the seaboard with which the canal route is a direct competitor, while in the country west of Chicago grain rates are much higher. There can be little doubt that a most important factor in securing these rates is the presence of the canal, which remains, even while the railroads carry most of the business, at least a potential competitor for the traffic, always available if the railroads attempt to raise rates much above profitable canal rates.

The rail rates on high-class goods also illustrate the effects of canal competition. At present the railroads carry most of this traffic in the face of much lower canal rates, on account of their better facilities for handling and delivering package goods,—a situation due, in considerable degree, to the advantages of large companies in securing suitable terminal facilities in New York. Nevertheless, the potential competition of the canals affects rates even on this traffic. The rates on high-grade freight from New York to competitive railroad points in Pennsylvania are from 10 to 35 per cent. higher than to points on the

canals at a corresponding distance from New York. Buffalo and Pittsburg are at almost equal distances from New York; yet the rates to Buffalo on sixth-class goods are 13 cents per hundred pounds, to Pittsburg 15 cents per hundred pounds. On first-class goods, rates to Buffalo are 39 cents, to Pittsburg 45 cents, per hundred pounds. Similar differences exist in the rates to Albany, Utica, Rome, Syracuse, Rochester, and intermediate points, as compared with those to Reading, Wilkesbarre, Harrisburg, Altoona, and way points distant from the water route across New York State.

Thus, even under present conditions, the canals seem to have been effective agents in reducing railroad rates, and as such have been far more important factors in transportation than is indicated by the aggregate or relative movement of freight over them; and it is not an unreasonable claim to make that merely as a regulating force on railroad rates the canals as they exist have a value to New York State much beyond their cost of maintenance.

It nevertheless remains true that the canal traffic depends not on railroad rates for high-class freight, but on the rates for bulk commodities. We have already noted that on grain the New York railroads have almost met the canal rates; while, with locomotives now building, it is expected to move heavier trains, and so make possible further reductions. On the other hand, the cost of materials and labor in the future will be higher than for several years past. Considering all of these points, it is probable that the New York railroads will before long be able to move grain at 2 mills per ton-mile (3 cents per bushel from Buffalo to New York), and possibly for slightly less than this figure; and, unless a materially lower rate can be made on the canals, the latter may be expected to lose most of what grain traffic they still retain.

IV.

The loss of traffic by the canals and the development of railroad traffic is in itself a significant economic change. The movement has, however, larger interests on account of its effects on general economic conditions, and more particularly on the development of New York as a commercial centre.

So far as the world aspects of the case are concerned, the problem is to secure the most efficient and least expensive labor-saving device for transportation. If an improved canal will provide a less expensive route for a large part of the heavy traffic movement across New York State than the existing railroads, or can develop a traffic not possible at present, then it is an economic disadvantage to confine transportation to the present methods. The economic gain to the world would be real, whether in its distribution the immediate advantage from the cheaper rate should be secured most largely by the Western producer, the New York middleman, or the consumer in Europe or the Eastern States. On the other hand, if an improved canal will not provide a less expensive transportation route, it would be an economic loss to undertake the improvement.

The city and State of New York have, however, a more direct and vital interest in the problem. So long as the Erie Canal remained the main transportation route between the lakes and the seaboard, practically the entire traffic between the lake region and the Atlantic States and Europe passed through New York. But, when the railroads carry the larger part of the traffic, New York has no longer this special advantage. The other Atlantic and even Gulf ports are as accessible by rail, and from many points more accessible, than is New York; and, with railroad transportation predominant, the commercial pre-eminence of New York is to some extent affected.

Thus far the effects of declining canal traffic have been most evident in the exports of breadstuffs from New York. There has been no positive decline in this commerce; but in the face of a vast increase in the production of breadstuffs in regions directly tributary to New York (Minnesota and the Dakotas) its percentage of the exports of breadstuffs has steadily diminished during the last twenty-five years, as indicated in the following table:—

NEW YORK'S PERCENTAGE OF EXPORTS FROM THE SIX PRINCIPAL UNITED STATES PORTS.

	<i>Flour.</i>	<i>Wheat.</i>	<i>Corn.</i>
1873-1882	70.42	63.35	47.70
1883-1892	46.06	60.22	46.57
1893-1896	43.99	56.13	32.55
1897	44.32	43.83	23.72
1898	37.61	55.49	26.14
1899 (January 1 to October 31) . . .	34.58	50.10	26.71

While most evident in the case of exported breadstuffs, the diversion of trade from New York to other ports has been sufficient to affect seriously the total volume of foreign trade, as indicated by the value of exported merchandise and the tonnage of vessels in the foreign trade. From 1886 to 1898, New York's percentage of the total exports from the United States declined from 46.5 per cent. to 36.1 per cent. During the seventies and early eighties, the tonnage of vessels in the foreign trade entering at New York was from 60 to 70 per cent. greater than the aggregate of such entries at the principal other ports (Boston, Philadelphia, Baltimore, New Orleans, and Montreal); but during the present decade the New York tonnage has increased but slowly, while the tonnage entering at other ports has continued to increase rapidly, until in 1898 the aggregate for the five ports named exceeded that at New York. In the direct trade to Liverpool, Boston alone now surpasses New York.

For the coming summer another serious diversion of

grain export trade from New York is almost inevitable. The Canadian government has just completed the last link in the series of canals around the rapids of the St. Lawrence River, which, with the Welland Canal, provide a fourteen foot waterway from the upper lakes to deep water at Montreal. A syndicate of Buffalo capitalists has made an agreement with the Montreal authorities for the erection of elevators at Montreal and the construction of vessels to carry grain by this route, guaranteeing to bring 25,000,000 bushels during the coming season and 35,000,000 bushels during each of the two succeeding years. This is equal to one-fifth of the total receipts of grain at New York, and more than one-fourth of the grain exports from New York. With the predicted freight rate by this Montreal route (4 cents a bushel from Chicago, equal to 1 mill per ton-mile) so much lower than existing or possible rail rates, there seems little doubt that a still larger proportion will before long be transferred from New York to Montreal, unless it is possible to provide an equally cheap water route across the State of New York.

V.

In 1895 the legislature and people of New York State authorized the issue of nine million dollars in State bonds, to be expended in the improvement of the Erie, Champlain, and Oswego Canals, by deepening them two feet, with the object of increasing the cargo capacity of canal boats to the extent allowed by the greater draft of water. By the summer of 1898 the \$9,000,000 had been practically expended, but with the work far from completed. An investigating commission appointed by Governor Black reported that about 36 per cent. of the improvement aimed at had been accomplished, 64 per cent. remained to be done, and that, while about a million dollars had been misspent, the total amount of nine millions was far from

sufficient to perform the task, and that fifteen millions additional would be necessary to carry to completion the work begun.

The political and administrative questions raised by this report do not directly affect the economic problems here under discussion. The work of improvement was necessarily discontinued, and it was soon suggested that what had been undertaken was not adequate to the situation. Governor Roosevelt, who entered office January 1, 1899, decided that before any further action was advisable there was need for a careful preliminary examination of the commercial advantages and the cost of various schemes for improvement, in order to determine what was the proper course to pursue. For this purpose he selected a committee, composed of prominent business men and practical engineers, who were requested to undertake the investigation, and to "formulate definitely the canal policy of the State."

This committee, composed of Francis V. Greene, (chairman), George E. Green, John N. Scatcherd, Major Thomas W. Symons, U.S.A., and Frank S. Witherbee, with the State engineer and surveyor, Edward A. Bond, and the superintendent of public works, John N. Partridge, has devoted almost a year to studying the economic and engineering problems; and its report has just been submitted to the governor and by him transmitted to the legislature.

The report emphatically opposes the abandonment of the canals, and takes the ground that, with adequate improvement, they can again become active factors in transportation and promoters of the commercial and industrial interests of New York State.

Of the various projects for improvement, that for a ship canal on the main trunk route is dismissed as a subject for proper consideration by the federal government. In fact, Congress has previously authorized surveys for such

a canal, which have been prosecuted for the last three years, are now almost completed, and will probably be presented to the present session of Congress. The New York committee, however, consider a ship canal of doubtful expediency at any probable cost. The large vessels built for the heavy weather and storms on the ocean and lakes are so expensive, both in construction and in operation, that a considerable rate of speed is essential to economy. That speed could not be obtained in a canal of any practicable dimensions; and the expensive equipment and navigating force would be a useless source of expense in the canals, which, in so long a stretch of artificial waterway, would add very materially to the rates of freight possible by such vessels on the open sea.

This conclusion was confirmed by the detailed study of projects for enlarging the Erie Canal, which demonstrated that on an adequate barge canal the cost of transportation could be brought nearly to the cost on the lakes, the cheaper construction and operating expenses needed for vessels used only on the inland route offsetting the advantages of large vessels. The investigations of the committee have included both the cost of transportation* under each of a number of projected improvements, and also the cost for executing each project. It was necessary, on the one hand, to ascertain probable freight rates, so as to determine whether a given project would be likely to develop traffic, and, on the other hand, to learn the cost, so as to judge whether the outlay would be within the limits of the direct benefits.

These investigations convinced the committee that for the Erie Canal the improvement begun in 1895 was not

*These estimates, made by Major Symons after consultation with boat-builders and canal boatmen, include interest, depreciation, and all operating expenses. They are based on boats moving in fleets or trains of four, one in each fleet being a steamer and providing the motive power. Full cargoes are estimated for the east-bound trip, and one-third cargoes on the return trip, with large allowances for detentions at the terminal points.

adequate to the situation at the present time. That project, when complete, would permit the use of boats of 320 tons capacity, or one-third larger than the boats now in use. The cost of transportation by such boats is estimated at one-third less than the cost on the present canal,—too slight an improvement to have permanent value, and yet requiring the further expenditure of thirteen million dollars to complete the work.

The committee presents, as the smallest project worthy of consideration for the Erie Canal, the largest possible extension of the improvement begun in 1895, adopting the depth of nine feet provided in that plan, but lengthening and deepening locks, and flattening curves, so as to provide for boats of 450 tons capacity. This, however, is not considered as a final and permanent work. For such the committee strongly recommends the adoption of a radically new plan, providing for the enlargement of the canal to accommodate barges of 1,000 tons capacity and ten feet draft, with locks capable of passing two boats at once. The route for either of these projects, selected after engineering investigations of several alternative routes, departs from the present line of the Erie Canal for about one-third of the distance, utilizing the Seneca and Oneida Rivers, Oneida Lake, and the Mohawk River. The present route was the best for the original canal, with its small dimensions and the necessity for a tow-path; but, for the large boats propelled by mechanical power, now contemplated, not only do the natural watercourses provide a better waterway for navigation, but the construction of the canal by this route is the more economical. Moreover the new route takes the canal out of the business section of Syracuse, and the larger project also goes around Rochester, avoiding the present difficulties both to navigation and city traffic.

The cost of these projects is estimated after careful engineering investigations at \$21,160,000 for the smaller

and \$59,000,000 for the larger. Under the smaller project the cost of transportation is estimated at 44 cents per ton, or $1\frac{1}{2}$ cents per bushel, of wheat from Buffalo to New York; under the larger project, 26 cents per ton, or .8 of a cent per bushel, of wheat. The ton-mile cost would in one case be .88 of a mill, in the other case .52 of a mill.

The capacity of the canal as enlarged under the smaller project would be 10,000,000 tons a year; and on that tonnage of through freight the saving in cost of transportation as compared with the present canal would be \$4,300,000 per annum. The capacity of the larger canal would be over 20,000,000 tons a year; and on that tonnage the saving in cost of transportation as compared with the present canal would be \$12,200,000 per annum. Comparing these figures with the estimates for cost of construction, it is seen that either improvement, even if less than half of the maximum tonnage is secured, will make possible a direct reduction in cost of transportation much more than the outlay for the improvement; while, in addition, New York State would gain indirect and immeasurable advantages by the development of its commercial and industrial activities.

Without attempting to measure accurately the tonnage likely to be secured, it is possible to indicate in a general way the possibilities of traffic. That the probable rates of freight on the improved canal will prevent further diversions of the export trade in breadstuffs from New York to other ports is almost self-evident; and this result of itself would warrant a large expenditure by the State. But the larger improvement certainly makes possible rates that will do much more,—will regain the trade already diverted, and re-establish the undisputed pre-eminence of New York in the export trade.

Perhaps of even greater importance are the possibilities in connection with the iron industry. The raw materials for the manufacture of iron and steel can be laid down at

Buffalo and vicinity as cheaply as at Pittsburg, the higher price for coal and coke at Buffalo being offset by the saving of the rail haul of ore from Lake Erie ports to Pittsburg. With an adequate waterway to the seaboard, manufactured iron and steel from Buffalo furnaces can be delivered in New York for one-fourth of the present cost of carriage from the furnaces to the seacoast,—a saving of \$1.50 per ton. Opportunities are thus offered for promoting the industrial development of western New York; for making New York Harbor the distributing centre for iron and steel products to the markets in the immediate vicinity and in New England and to the rapidly increasing market in foreign countries; and for developing on the Hudson River a large shipbuilding industry. And it is not too much to say that the possibilities in these directions justify a comprehensive enlargement of the Erie Canal fully as much as the prospect of transporting bread-stuffs justified its original construction.

Nor is it impossible that, with the low rates of freight by such an enlarged canal, it will be found cheaper to ship west-bound coal by the indirect canal route than by the more direct railroad routes; while a large east-bound traffic in bituminous coal to the New England manufacturing districts may also be developed. Still more, it is at least probable that, with a water route such as has been proposed, regular lines of steamers can be operated at as great a rate of speed as freight trains, and secure no inconsiderable amount of package freight business.

All of this assumes a thoroughly competent system of business management, both of the canals themselves and of the transportation lines; and the committee have insisted that no money should be spent for further enlargement unless the limitation on capital of canal navigation companies shall be repealed, the State employees on the canals organized on a basis of efficiency and permanent tenure, and the laws regulating contracts revised so as to

prevent any mismanagement in the execution of the improvements.

The minor canals do not offer such large opportunities for developing trade and industry as does the Erie Canal, and no radical enlargement of these has been proposed. For the Oswego and Champlain Canals the completion of the improvement of 1895 is recommended, at an estimated cost of \$2,640,000. The completion of this project will make the Oswego Canal suitable for boats of 320 tons capacity, and the Champlain Canal suitable for boats of 240 tons capacity. For the Black River and the Cayuga and Seneca Canals no improvement is recommended.

VI.

The financial aspects of the New York canals have been the subject of frequent discussion, and a clear understanding of the matter is desirable.

Down to 1882 the canals of New York were operated strictly as a business undertaking, tolls being collected on all boats to meet the expenses of construction and maintenance. After the completion of the Erie Canal in 1825 the revenues from tolls were at once sufficient to meet all expenditures for maintenance and for interest and sinking fund on the debt incurred for the original construction. With the increase in traffic the revenues produced a surplus, and in 1841 and thereafter a considerable sum was annually paid from the canal revenues to the general fund of the State treasury. The records show that, without any cessation of these payments, after 1844 counter-payments were made from the general fund to the canal fund, and for thirty years these payments and counter-payments continued to be made. In 1875 the payments from the canal revenues to the general fund ceased; but the payments on the other side continued, and since 1882 all the expendi-

tures for the canals have been met from the proceeds of the general State taxes.

A thoroughly accurate balancing of the accounts with the canals would require the careful calculation of interest on all payments in both directions. In 1876 the auditor of the canal department prepared a statement of the revenues and expenditures on each and all the canals down to 1874, charging and crediting interest at the rate of 6 per cent. per annum, not compounded. This statement shows that the minor canals were a distinct financial burden to the State, the expenditures for maintenance on several of them being from three to four times the total revenue. Excluding interest, the loss on these canals was \$23,000,000. Including interest, the loss was \$50,000,000. Most of these canals were abandoned in 1877, their construction having clearly proved to be a mistake.

The revenues from tolls on the Oswego, the Champlain, and the Cayuga and Seneca Canals more than paid all expenses for maintenance and operation, leaving a surplus sufficient to pay a small dividend on the cost of construction.

As to the Erie Canal, the financial balance was steadily and largely in favor of the canal. The account, including interest, down to 1874, showed a surplus of revenues over operating expenses of \$196,000,000, and a surplus of revenues over all expenses for operation and construction of \$63,000,000. Excluding interest, the latter surplus was \$38,000,000. In 1882 a similar balance, excluding interest, showed that the surplus had risen to \$42,000,000 over all sums paid out on it for any purpose. Even including all the expenditures since 1882, against which there has been no direct revenue, the surplus, excluding interest, on the Erie Canal is almost \$20,000,000. If interest were included, this figure would be largely increased.

The cost of the proposed enlargement naturally suggests comparisons with former expenditure. The original construction of the Erie and Champlain Canals cost \$9,000,000, a sum equal to 3 per cent. of the assessed valuation of the State at the time the work was undertaken. By 1845 the total expenditure for canal construction and enlargement was \$30,000,000, equal to 5 per cent. of the assessed valuation at that time. When the enlargement of the Erie Canal was completed in 1862, the total cost of construction and enlargement was \$56,000,000, equal to 4 per cent. of the valuation of 1860. The State canal debt in 1860 was \$27,000,000, the largest amount outstanding at one time; but in the decade 1840-50 the debt was much larger in proportion to valuation, reaching the highest percentage, 3.8 per cent. in 1844.

The estimates for the improvements now recommended aggregate \$62,000,000, which is 1.3 per cent. of the present valuation of the State. On 3 per cent. bonds, redeemable as required by the State constitution in eighteen years, the annual charge for interest and sinking fund would be \$4,508,020, about 10 cents per \$100 of present assessed valuation, which rate would decrease year by year as the valuation increases.

In the past, such outlay for canal construction, so far as it related to the Erie Canal, has been more than repaid, as we have seen, in tolls. Similar results could undoubtedly be produced by tolls on the traffic developing on the enlarged canal but for the existing constitutional prohibition of tolls. The committee have, however, recommended an important change in the apportionment of the cost of improvement, by assessing the entire amount on the canal counties. Such a method is based on the same principle as special assessments for local improvements. The canal counties contain 80 per cent. of the population of the State, and 90 per cent. of the total valuation of the State, so that the proposed change does

not involve any large increase in the charge on them, while it relieves the counties not on the canal route, which receive only indirect benefits from the canals.

The recommendations of the committee are now before the legislature and people of New York State. The projects presented are the result of careful and systematic study of all sides of the question. Their execution requires the enactment of a statute by the legislature and a vote of the people authorizing the necessary loans.

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